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ABSTRACT

This document reviews 14 instruments for measuring attitudes and values in environmental education. Comments are made on the strengths and weaknesses of the instruments and the restricted nature of their content. Lists of additional sources and references cited are also included. (SL)

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ENVIRONMENTAL EDUCATION INFORMATION REPORTS

AFFECTIVE INSTRUMENTS
IN
ENVIRONMENTAL EDUCATION

by John H. Wheatley

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and Environmental Education
The Ohio State University
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ENVIRONMENTAL EDUCATION INFORMATION REPORTS

Environmental Education Information Reports are issued to analyze and summarize information related to the teaching and learning of environmental education. It is hoped that these reports will provide information for personnel involved in development, ideas for teachers, and indications of trends in environmental education.

Your comments and suggestions for this series are invited.

John F. Disinger
Associate Director
Environmental Education

Sponsored by the Educational Resources Information Center of the National Institute of Education and The Ohio State University.

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Introduction

Environmental educators are becoming increasingly aware of the important role which attitudes and values have in determining the action of an individual toward the environment. Consequently, instruments which can measure these attitudes and values are in demand. The purpose of this paper is to present several affective instruments in environmental education which are currently available (or soon will be) and some of the test data which these instruments have produced. The instruments included herein are those which this author was able to review personally; comments are made as to the relative strengths and weaknesses of some of the instruments or to the restricted nature of the content. Also, several additional sources of information concerning evaluative instruments are given. It is hoped that persons who have need for an affective instrument in environmental education will make use of the instruments already available that suit the purpose or at least will use the available data base in constructing an appropriate instrument; much energy is wasted in instrument development when suitable measures are already at hand. In addition, the reader's attention is drawn to the use of the ERIC (Educational Resources Information Center) microfiche library collection as a ready access source to educational literature; although copyrighted test materials cannot be obtained through ERIC, many research studies using evaluative instruments are available. The "References" section of this paper notes ERIC document numbers for many citations.

Barnhart (1971)--Inventory of Societal Issues (ISI)

Richard Barnhart, Evergreen State College, has developed an attitudinal instrument for use with secondary school teachers. The Inventory of Societal Issues (ISI) is a 60-item test using a five-point Likert scale to assess attitudes toward societal issues which when analyzed break into seven science-society related factors, including "regard for human life," "need to cooperate with nature," "concern with control of population," and "need to take responsibility for societal woes." Based on a sample of 414 secondary school teachers in Oregon, the seven attitudinal factors showed internal consistency measurements ranging from 0.36 to 0.82, using the Kuder-Richardson 20 formula; the Spearman-Brown correction to Pearson product-moment correlation coefficients ranged from 0.41 to 0.91. For the total ISI test, the KR-20 reliability was 0.85 and the S-B correction was 0.82.

An interesting aspect of the ISI is the inductive technique used in its development. Rather than the researcher selecting the general referents a priori, the inductive technique has the researcher identify the general referents from the response patterns of the subjects after they have

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reacted to the test items (specific referents). In this instance the researcher's area of interest (general referent) was only broadly defined. Specific referents were selected from a wide diversity of sources - popular and professional journals, books, television programs, individuals - so that these would be biased as little as possible. Attempts were made to use whole statements from the sources so that the researcher bias would not be reflected in the statement construction.

Approximately 250 items were used in the original item pool. Groups of university and high school students responded to the items on four separate occasions. Some students were asked to criticize items or to explain why they responded as they did; after each pilot test the items were revised. The final preliminary version was given to 304 high school seniors in Oregon; the results were submitted to a factor analysis program which identified twelve factors; of these, seven factors were interpretable and retained in the final form of the Inventory of Societal Issues.

Bowman (1972)--Opinions About Environmental Issues

An unusual type of attitudinal instrument has been developed by Mary Lynne Bowman at The Ohio State University. The purpose of this instrument - Opinions About Environmental Issues - is to assess the college student's attitude toward the determinants of environmental issues, whether the issue is the responsibility of the individual or of society. Using Roth's Environmental Management Concepts: A List (1970), a panel of experts placed these concepts in one of four major areas: bio-physical, social-cultural, environmental management, and change and dynamics. Bowman used the five highest ranking concepts from each group as the basis for writing test items; at least two items were produced for each of the twenty concepts. Final items were submitted to a panel of professors from several disciplines at The Ohio State University for review as to content validity, ambiguity, and readability; 75% agreement was required for an item to be included on the instrument without modification. This same panel was also asked to indicate for each item whether a person agreeing with the item would "1) favor group or societal decisions to determine the environmental issue; 2) favor the individual as a determinant of the environmental issue; or 3) have a neutral ('useless to worry' and/or 'helpless to act') attitude toward determining environmental issues."

The final form of Opinions About Environmental Issues contains 109 items, most of which use a five point Likert scale to indicate agreement, neutral, or disagreement with statements about environmental issues; ten items survey the behavior of the respondent's immediate family, and nine items survey the respondent's choice of a belief statement. A scoring procedure was developed for the ninety non-survey items so that on items indicating a positive attitude toward society as the determinant of environmental issues responses of "agree" and "strongly agree" were designated as correct; correct items were scored as one point. Neutral items were not scored, but remained as a part of the instrument since they represented a position held by some people and since these items act to provide a break in the monotony of responding to heavily biased items. Consequently only 64 items on the instrument were scored. In a pretest-posttest sample of over three hundred college students K-R 20 internal

consistency reliability coefficients of .782 and .824 and standard deviations of 6.66 and 7.44 were obtained; the reliability coefficients are good for an affective test, but the standard deviations indicate a rather narrow spread of scores.

Bowman reports the use of this instrument in a pretest-posttest situation with control and experimental grouping consisting of undergraduate students enrolled at The Ohio State University. The experimental group was a class of students in an environmental management course; the control group was a class of secondary education students. The analysis of data indicated a significant increase (at the .05 level) in the mean posttest score for the experimental group, but no significant increase for the control group. Bowman interprets this to indicate that the attitude of the experimental group had shifted toward a recognition of society as the agent which determines (causes) environmental issues. Having narrowed the environmental attitude to be measured to a single focus - attitudes toward determinants of environmental issues - Bowman suggests that the nature of environmental education may place certain restrictions on the number of attitudes that may be assessed by a single instrument.

Opinions About Environmental Issues in its final form contains 64 scored items, 26 "neutral" items, and 19 survey items. The instrument seeks to assess the attitude of the examinees toward the determinant - society or the individual - of environmental issues. The test has been used successfully as a pretest-posttest measure with college students. More study is needed to determine the role of the neutral and survey items and to accumulate baseline data.

Fleetwood (1972)--Environmental Attitude Inventory--Form B

George R. Fleetwood of the North Carolina Department of Public Instruction has developed the Environmental Attitude Inventory--Form B for use in assessing environmental attitudes of high school students. This instrument, which has been used to evaluate several ESEA Title II projects in North Carolina and Virginia, is available from the author and is accompanied by a user's manual which discusses the validity, reliability, and standard error of measurement for the instrument.

This instrument contains 72 multiple choice items where the student responds as to whether or not he believes in a particular manner, or agrees with a particular statement. The questions are divided equally into four areas of concern or subscales--study of the environment, conservation of natural resources, pollution, and politics and policy making.

Based on the response of a jury of experts in environmental education, Fleetwood further classified the items in each subscale into one of the lower three categories of Krathwohl's (1956) hierarchy of affective objectives--receiving, responding, or valuing. The result is that on the Environmental Attitude Inventory--Form B, each subscale has six items in each of the three affective categories for a total of 18 items in each of the four subscales.

The instrument was tested on 1,633 tenth grade biology students. The result of the testing program produced a mean raw score of 37.92 and a standard deviation of 12.31 which provides a wide spread of scores for discrimination purposes. The standard error of measurement produced for this instrument was approximately 4, indicating that about 67% of the time a student's "true score" will be within ± 4 points of his actual raw score in the Environmental Attitude Inventory. Although this standard error is high, the large standard deviation (12.3) lessens its effect and makes the instrument useful for interpreting individual scores.

Using his sample of 10th grade students, Fleetwood determined internal consistency reliability for his instrument using the Kuder-Richardson Formula No. 20; this resulted in a reliability index of .907 for the whole test with the reliability of the subscales ranging from .702 to .750. For a sample of 83 students, Fleetwood obtained test-retest coefficients of .810 for the whole test and .655 to .770 for the subscales. The K-R 20 and the test-retest coefficients are high and suggest that both the whole test and the subscales have a high degree of stability.

The users' manual for the Environmental Attitude Inventory--Form B also includes testing norms based on the 1,633 students who participated in the field-testing of this instrument. These scores are given in the form of percentile rank, z-scores, standard scores, and stanines.

The Environmental Attitude Inventory--Form B seems to hold good promise for assessing environmental attitudes of high school students and adults. The instrument does not rely on a great deal of cognitive information in answering the items. The readability of the test restricts its use to high school reading levels and above. In the users manual, Fleetwood does not show any statistics concerning the placement of the items in the categories of Krathwohl's affective hierarchy. This information could be useful and should be included.

Hounshell and Liggett (1973)--Environmental Knowledge and Opinion Survey (EKOS)

Paul B. Hounshell and Larry Liggett report the use of the Environmental Knowledge and Opinion Survey (EKOS) in assessing the effectiveness of environmental education with sixth grade students in North Carolina. The EKOS test was originally designed by a psychologist and a science educator, field tested, and analyzed for coverage of Bloom's (1956) hierarchical components. The test items were then submitted to a panel of experts composed of five science educators at the college level and five full-time environmental educators at the elementary and secondary levels. The panel produced a 65-item EKOS test with two subscales; the thirty-five items on the knowledge subscale measure how "environmentally informed" the student is while the thirty-item attitudinal subscale assesses how positive or constructive the student's attitudes are toward the environment. After administering the test to 2500 sixth grade students, the reliability of the knowledge subscale was calculated at 0.7130 while the reliability of the attitude subscale was determined to be 0.7742.

Using the Environmental Knowledge and Opinion Survey, Hounshell and Liggett evaluated a random sample of 1900 sixth grade students on two aspects of environmental education: 1) knowledge about the environment and man's relationship to it, and 2) attitudes toward the environment. An analysis of the test results shows that the students from urban schools scored significantly higher (at the .05 level) on the knowledge subscale than students from rural schools; no significant difference between the two groups was found in the attitude subscale. Female participants had a significantly more positive attitude score (at the .001 level) than did participating males; there was no significant difference between the two groups on the knowledge subscale. One especially exciting find in analyzing the subscale scores of all the participants showed a significant (at the .01 level) positive correlation between mean scores on the attitude subscale and knowledge subscale.

Since completing their study, Hounshell and Liggett have revised the EKOS test on the basis of an item analysis. The new version of EKOS consists of fifty objective items with a twenty-seven item attitude subscale and a twenty-three item knowledge subscale. A statistical analysis of this new test form is not available at the time of this writing. The test itself appears to be adequate for assessing general knowledge and opinion about the environment; its use on a test-retest basis has yet to be determined. As an experimental instrument, use of the Environmental Knowledge and Opinion Survey is encouraged; notification of its use and the results should be communicated to Hounshell and Liggett so that statistical data on the instrument can be tabulated.

Kellner (1971)--Environmental Concern Inventories (ECI)

Project I-C-E (Instruction - Curriculum - Environment) is an ongoing program of the Wisconsin Department of Public Instruction for helping teachers improve instruction in environmental education. One product of the program is a set of Environmental Concern Inventories (ECI) for attitudinal assessment. There are three versions of the ECI according to grade level - K-4, 5-8, and 9-12. The original version was administered to over 9,000 students in northeastern Wisconsin, and the current ECI instruments are a result of analysis and revision of the original. Project I-C-E has also developed a cognitive instrument - Environmental Cognitive Inventory (also ECI) - which is being used in conjunction with the affective instrument in a pretest-posttest design to determine the impact of the program (I-C-E) in the participating schools.

The K-4 Affective ECI uses large type and stick drawings to appeal to this age group. The fifteen questions are divided into four subtests - pollution, population, conservation, and solid waste - of five, five, three and two questions each. The use of such a small number of items on a subtest is questionable. Some of the items appear to be more cognitive than affective, e.g., "What one thing do you need to stay alive? 1) Water, 2) Paper, 3) Cars." Based on statistical analysis, the project director reports that the K-4 ECI is "most valid at the first and second grades."

The 5-8 Affective ECI is most valid for grades 6 and 7. In this version the items are problem oriented with the student choosing one of several alternatives to solving the problem; this format is interesting and should

be quite effective. This ECI version has 23 items and 6 subtests - water pollution, air pollution, noise pollution, population, conservation, and solid waste disposal. The number of items on each subtest ranges from two to seven; the use of such subtests is questionable, and further data analysis will have to substantiate this subtest breakdown.

The 9-12 Affective ECI has the same type of problem-oriented items as in the 5-8 version; this version has proven most valid at grades 10 and 11. This instrument has 24 items with the same 6 subtests as found in the 5-8 version; again the use of subtests with 2 or 3 items is questioned. In securing data on this instrument the "Summary of ECI Test Results" reports that the instrument was taken "too lightly" by juniors and seniors; this is possibly due to the use of such juvenile terms as "the town of Plentyville," "Farmer Bounty," four different cultures of "Blipper, Blooper, Walla, and Nanga."

Despite the objections cited, the three versions of Project I-C-E's Environmental Concern Inventory seem to have potential. The use of drawings in the K-4 version and the problem-solving approach in the 5-8 and 9-12 version is quite promising. All three forms of the ECI are oriented toward environmental problems and can best be used in evaluating student needs and growth in the area of environmental management. The accumulation of baseline data and "norms" would be most helpful in this area.

Kleinke (1972)--Syracuse Environmental Awareness Tests (SEAT)

The SEAT tests were developed at Syracuse University by Gardner, Kleinke, and Cohen, beginning in 1971, through funds provided by the Northeastern Environmental Education Development (NEED), a consortium of the State Education Departments of nine northeastern states, under a grant from the United States Office of Education. Inquiries regarding the SEAT tests may be made through NEED, New York State Department of Education, Division of General Education, Albany, New York 12234.

The Syracuse Environmental Awareness Tests--Level III were developed to "measure knowledge of and concern for man's environment among high school students and adults." At the time of development, few environmental education curriculum programs were available; consequently, the SEAT staff was unable to identify "typical" programs to evaluate. Instead, through several conferences with high school and university personnel, a "broad content outline for a hypothetical course in environmental education" was produced. This outline contained seven content areas: 1) Pollution of the air, 2) land, and 3) water; 4) Noise pollution; 5) Population; 6) Science, growth and technology (concerning "unchecked and ecologically destructive growth of industry"), and 7) Ecological relationships (dealing with "relationships within and among environmental issues" as well as bio-systems and communities).

The SEAT authors constructed four forms of the tests--A through D. Forms A and B (by Gardner and Kleinke) each consist of 56 cognitive questions. These two forms are completely non-overlapping (i.e., they each contain a different set of questions), and each form asks questions in all seven of

the content areas. The questions are quite specific and mostly (84%) assess only the lowest levels of the cognitive domain. Forms A and B place an almost total emphasis on man-made environmental problems, or very little assessment is made of knowledge of natural areas or areas where man's influence is not rampant.

Forms C and D of the SEAT tests (by Gardner, Kleinke, and Cohen) evaluate attitudes of high school students and adults toward environmental problems. The two forms have entirely different purposes. Form C contains 105 paired statements contrasting the environmental problems of the seven content areas. The examinee is forced to state a preference for dealing with a problem in one content area over that in another. Each content area is paired with each of the other six areas in five separate questions; for example, an examinee is forced to choose between a concern for noise pollution or water pollution in five questions, between noise pollution or population problems in five other questions, and so on. Consequently, any one area may be preferentially selected in 30 different questions, and the relative importance of each content area to the examinee can be shown. Form D uses a similar format to contrast the seven content areas with other types of social problems such as drug use, welfare, civil rights, etc. A high total score (Total Environmental Concern) indicates a greater concern for environmental issues than for other social issues. The total score can also be subdivided to indicate the degree of concern for each environmental content area.

For all four tests - cognitive and affective - baseline data on the sample population are given. A break-out of the population by state and by community size for each test and subtest is given in numerous tables. All four tests are designed to be administered within a 45 minute class period. The cognitive tests - Forms A and B - are not examined in detail since they do not fall within the parameters of this article.

Norms for both Affective Tests of SEAT (Forms C and D) are determined by raw scores obtained from a sample of over 1,250 eleventh graders "selected to represent the performance of high school juniors within the Middle Atlantic and New England states." Form C percentile ranks and "P-values" (the percentage of examiners selecting a "correct" response) are provided for each of the seven environmental content areas as well as the means, standard deviations, standard errors of measurement [these are given in the draft copy of the Administrative Handbook and not in the Final Report] and reliability coefficients. The same statistical information is given for Form D for the Total Environmental Concern score and subtests. In many items on both tests, the stem of the question may interfere with the examinee's choices by presenting a situation in which the individual would not normally participate (e.g., "I would rather join a demonstration in support of..." or "I would rather donate 10% of my income to...") although test directions caution the examinee against being influenced by the stem and request that he answer all questions.

Form C determines the student's relative concern for the seven environmental content areas; consequently, any evaluation of the results requires use of the individual subtests. Each of the subtests contains 30 items, all of which overlap with other subtests for a total of 105 items in Form C. Only two of the subtests (noise pollution and population) have an internal consistency (KR-20) above .80. In the remaining 5 subtests with

KR-20 coefficients of .78 to .60, random errors contribute 22% to 40% of the raw score; the subtest test-retest reliabilities range from .53 to .75. In four of the subtests, the standard error of measurement is half or more of the standard deviation for that subtest; consequently, shifts of a student's raw score within such a test could largely be due to error. Form C can probably best be used as a one-shot test to determine a student's relative concern for the seven specific environmental areas and comparison with the norms provided in the users' manual.

Form D determines the examinee's relative concern for the seven environmental content areas versus other types of social problems (drug use, civil rights, and others) on the total raw score. This form produced an internal consistency reliability (KR-20) of .95, which is especially good for an affective test; the KR-20 for the subtest ranged from .75 to .80. The test-retest reliability for approximately ninety examinees was .78 with the subtests ranging from .57 to .74. The test-retest coefficient for the total test indicates this form is fairly stable although the subtest in environmental relationships is a little weak. The raw scores for Form D are spread out over a long curve (SD 20.3), making shifts in scores readily detected. The standard error of measurement is high (4.5) but its effect is lessened by the large standard deviation. Form D can best be used as a total test showing the examinee's preference in dealing with environmental problems or other social problems. Some of the subtests show promise but further data will be necessary to substantiate their use.

The affective parts (Forms C and D) of the SEAT tests mainly reflect concern for environmental problems and their relative importance to the examinee. The final copy of the Administrative Handbook provides extensive baseline data relative to community size and state of residence; however, it would be helpful for interpretation of individual scores if the standard error of measurement for each test had been included. Form C does not appear to be sensitive to attitudinal change and probably is best used as a one-shot comparison with the 11th grade norms provided. Form D seems to be somewhat more sensitive to attitudinal shifts. Studies using Form D in a pretest/posttest approach need to be undertaken to support the use of Form D in this role.

Mehne and Goulard (1973)--Environmental Attitudes Semantic Differential

An apparently useful semantic differential instrument has been developed by Paul Mehne and Gary Goulard at the State University of New York at Syracuse. Using ten sets of bipolar adjectives, subjects are asked to respond to concepts on urban design, sand dune and beach development, and wetland usage. The Environmental Attitudes Semantic Differential was constructed to assess seventh and eighth grade students and eleventh and twelfth grade students on attitudinal changes induced by viewing televised environmental spot announcements; neither the results of the study nor test statistics were available at the time of this writing. Each test form uses the same bipolar adjective sets but for each concept the adjective sets may be located differently in the list of sets and the two bipolar adjectives may be shifted from the right side of the scale to the left side and vice versa (e.g., "good....bad" or "bad....good"). The twelve concepts used include "regulated access to beaches," "reclaiming wetlands for building

development," "urban planning," and "existing cities;" the adjective sets represent the two extremes on a seven point scale and include such pairings as "ugly-beautiful;" active-passive," "changeable-stable," and "soft-hard." In some instances, the adjective pairs do not seem particularly appropriate to the concept presented; a subject may have difficulty rating "city parks" on a "hard-soft" scale. The adjective pairs selected for the instrument do seem to represent clear and opposite ends of a scale, thus making each scale unambiguous. The Environmental Attitude Semantic Differential appears to have great potential, but the value of the instrument cannot be fully ascertained until the analysis of the test results is known.

Passineau (1974)--Environmental Awareness Inventory (EAI)

Joseph F. Passineau at Utah State University is in the process of developing an environmental attitude instrument - Environmental Awareness Inventory (EAI) - for use with upper elementary and junior high school students. Passineau believes that, in order to provide the 'internal motivation necessary for sustaining a lifetime commitment to enhancing environmental quality," teachers should use student-initiated learning that is based on the students' personal interests, needs, and concerns.

The EAI is being developed to meet the challenge and to aid teachers in grades 5-9 in assessing their students' interests in and attitudes toward environmental issues and orientation toward and knowledge of environmental problem-solving activities. To make the instrument interesting and stimulating for the students, a variety of item types will be used, including attitude scales, short story situations, and cartoon caricatures.

The EAI is expected to require approximately two hours or four 30-minute periods to administer. The tests are designed to be hand-scored by the teacher to provide immediate feedback on several subtests for the group or on individual students. Passineau has solicited responses from many people in environmental education in developing the Environmental Awareness Inventory; it is hoped these efforts will be well spent.

Perkes (1973)--Environmental Knowledge and Attitude Inventory

One of the most extensive environmental attitudinal surveys is currently being undertaken by The Center for Science and Mathematics Education at The Ohio State University, where attempts are underway to assess environmental knowledge and attitudes of a sample of 10th and 12th grade students from all 50 states and the District of Columbia. Three forms (A, B, and C) of the Environmental Knowledge and Attitude Inventory were developed by the staff of the ERIC Clearinghouse for Science, Mathematics, and Environmental Education, the staff of the Center for Science and Mathematics Education of The Ohio State University, and selected consultants.

Each form contains 39 or 40 test items. Some items are unique to one form, and other items are found on two or three forms. The items are broadly classified in four areas: Bio-physical Environment, Scientific-Technological Influences on the Environment, Environmental Health and

Safety, and Social Influences on the Environment; the items are all multiple-choice and deal with facts, concepts, and attitudes in these four areas.

The first part of the national survey using the Environmental Knowledge and Attitude Inventory was undertaken in early 1973. Perkes sampled secondary schools in five states in the Great Lakes Region and six states (including Alaska and Hawaii) in the Far West Region. Using all 8,999 public secondary schools in the 11 states as his population, Perkes determined the number of schools to be sampled in each state on the proportion between the total number of secondary students enrolled in secondary schools in the United States. Comparable steps were used in determining the number of schools to be used in the sample from each county within the 11 states. Individual schools were then randomly selected. Within each school, 30 tenth-grade students and 30 twelfth-grade students were randomly selected, or representative tenth-grade and twelfth-grade classes were selected. Approximately 30% of the sample, over 9,000 students in 199 schools, completed the inventory for Perkes' study.

Of the total number of items on each form of the inventory (39 or 40 items, depending on the form), 14 to 16 of the items (depending on the test form) assessed attitudes toward the environment. A closer examination of the attitudinal items shows that each of the three forms contained items on population, pollution (general), land use, environmental health and safety, social influences, and societal problems. Each form also allowed the student to specify which environmental problem he thought was most serious in his community and whether he thought this environmental problem was more serious than other societal problems such as crime, traffic accidents, and health problems.

In a sample of 2,218 students, KR-20 internal consistency reliability coefficients were obtained. The three test items soliciting opinions on the most serious environmental problem in a community had a reliability coefficient of .78, .80, and .79 for Forms A, B, and C respectively. While the remaining affective items showed KR-20 coefficients of .85, .83, and .86 for the three forms. (KR-20 reliability coefficients for the cognitive portion of Forms A, B, and C were .92, .91, and .92 respectively.)

Test-retest coefficients were determined for the whole test with three separate pilot samples of approximately 600 students. The test-retest coefficients obtained were .77, .80, and .85. The reliability coefficients from the KR-20 and test-retest determinations suggest that the Environmental Knowledge and Attitude Inventory is quite stable and produces consistent scores.

In the analysis of data in Perkes' study, a chi-square statistic based on proportions instead of total number of cases was used, since the number of cases per state (3,000-10,264) varied over a large range. No attitudinal differences in proportions were found based on grade level or sex of the student. However, differences based on state of residence and size of community were found. Items asking the student to indicate what he thought was the most pressing environmental problem correlated highly with state and community size.

The importance of Perkes' study on the states of the Great Lakes Region and the Far Western Region lies in the accumulation of baseline data on

environmental knowledge and attitudes for tenth and twelfth-grade students in the United States. National norms can be determined as current research by Bohl and Rondeau dealing with other regions of the United States is completed. The statistics available on the Environmental Knowledge and Attitude Inventory indicate that this test is successful in assessing environmental attitudes and knowledge. The use of the affective items alone has not been undertaken, although the affective subtest statistics are favorable; the stability and consistency of this portion of the Inventory is further substantiated by early analysis of the work by Bohl and Rondeau showing that, on an average, responses to the affective items differ by less than 2.0% from the responses obtained by Perkes.

University of Wisconsin-Green Bay-Office of Educational Development

The Office of Educational Development at the University of Wisconsin-Green Bay (UWGB) has developed an interesting approach to attitudes and values. As a part of the Freshman Testing Program, a Value Survey is included. This survey (modified from work by Milton Rokeach of Washington State University) presents the incoming students with 23 undefined words or phrases in order of importance; these items include such terms as "Environmental Preservation," "Creativity," "Personal Fulfillment," "Career Preparation," "A World at Peace," and "Community Improvement." The student is asked first to rank these items in terms of importance to him and then to rank the items in the order he believes represents the UWGB institutional value system. Used in conjunction with the Value Survey is the Perry Developmental Scheme (PDS), a pattern of psychological development delineated by William G. Perry, Jr., Director of Harvard University's Bureau of Study Counsel. Through the PDS, an attempt is made to evaluate how firmly the values are held by the student, e.g., commitment, relativism, etc.

Related to the considerations of values and attitudes are a number of studies being conducted at the University of Wisconsin-Green Bay on the dynamics of student discontent. Using a 54-item instrument, UWGB is attempting to examine a generalized dissatisfaction factor, appropriately called Grump. The items on this instrument (quality of life, individual development opportunities, city life, education, economic system, big business, ecological manipulation, and so on) are designed to reflect components of the general American scene, and the respondents are asked to indicate their attitudes and feelings toward each item by rating it on a five-point scale from Very Satisfied to Much Dissatisfied. One interesting result from these studies is that in the emergence of principal components of the Grump factor, one component appears to be identifiable as an "ecology" factor; further analysis and interpretation are needed before continuing with these data.

Defining "environment" in broad terms, UWGB has developed an instrument - Social Judgment Study - which attempts to assess attitudes toward the social and cultural environment. This instrument uses photographs of persons of various cultural origins and asks the examinee to write down what "seems to be the most natural way" to classify the pictures. The student is also asked to identify those persons whom he thinks would share his "essential beliefs and values." This instrument is now being standardized.

Van Meter (1972)--Semantic Differential Technique

Van Meter, from Ball State University, has used the Semantic Differential Technique to assess attitudinal changes in sixth-grade students after a five-day outdoor education experience. The instrument consisted of ten "concepts," such as Enjoying the Outdoors, Getting Along with Teachers, and Knowing About Manners. The students were asked to rate each "concept" on the same series of fifteen semantic differential pairs including important-unimportant, refreshing-unpleasant, and stimulating-monotonous. Van Meter found significant differences (.05 level) between pretest and posttest responses in two out of four groups of students who participated in the camping experience. Van Meter concluded that resident outdoor education programs do not always result in positive attitudinal changes for all students; many other factors are involved. The absence of data on instrument validity and reliability makes it impossible to evaluate the instrument; however, the experimental design used in this study allows many external factors to affect the results.

Survey Instruments

Many organizations have developed specialized survey instruments to assess attitudes and opinions of a restricted population or toward localized issues. Some instruments of this type are mentioned below.

Bickel and Markell (1974), Minot State College, have developed a preference questionnaire which contains some attitudinal components; more importantly, the results of the questionnaire are intended to be used to influence the development of natural resources in the state of North Dakota. The Student Career Preference Questionnaire was developed for high school seniors to ascertain their "hopes and plans" for the future and beliefs and attitudes toward the development of state resources, especially lignite coal deposits and water resources. The instrument itself is occasionally unclear in its directions to the students, but the use of such a study to influence state policy in resource development has great potential.

E. J. McPartland (1974), of Doane College, is heading a research team in measuring attitude and motivational change in Nebraskan residents toward the Big Blue River Basin water plan. A survey instrument determining apathy, antagonism, motivation, and knowledge of the basin water plan has been developed. Three educational programs, using newspaper articles, a speaker's bureau, or a house-to-house canvassing, will be implemented in three insulated areas; a final survey utilizing a Likert-type scale and a factor analysis will test the effectiveness of the different educational tools and the feasibility of undertaking an educational program to develop favorable attitudes toward the water basin plan.

The Michigan United Conservation Clubs under Richard Taylor (1973), Director of Environmental Education, has developed a survey instrument for obtaining members' opinions on various environmental concepts. The survey - Environmental Attitude Questionnaire - asks the individual to indicate what he considers to be the most important environmental problems, to list the group (lawmakers, judges, citizen groups, industry, etc.) which he thinks has the greatest power to improve the environment, to name what extra-curricular school organizations should be involved in environmental education, to tell where the best place to learn about the environment is, and other similar questions.

The Oklahoma State University Extension Survey under Project Director J. O. Grantham (1974), has developed an Environmental Problem Study. The OSU Extension Service used as its sample various individuals throughout the state who were "active leaders interested in various community activities." The survey instrument used a Likert-type scale to have the individuals identify environmental problems, report what they consider to be obstacles to the solution of environmental problems, and explore the components of the decision-making atmosphere as it affected subsequent environmental decisions. Over two thousand responses were received and used in data analysis; responses were also broken down by neighborhood (urban or rural) and group affiliation (such as county development council, county commissioner, municipal official, sub-state planning district staff, and others). The complete report provides a wealth of data on the attitudes and perception of the various groups; briefly, the major problems identified were land pollution from roadside dumps, soil erosion from unsurfaced roads, land pollution from salvage yards and soil erosion from rural areas; the primary obstacles to solution were given as public apathy, "failure to appreciate problems," and "lack of public awareness;" in order for decision making to occur, the respondents indicated a need for "recognition of the people, resources, and special interests involved" and for "unbiased specialists."

Additional Sources

Many individuals and groups across the country are becoming increasingly interested in the assessment of attitudes and values in Environmental Education. The proliferation of instruments makes it impossible for this author to review all of them. Several sources are available for gathering information on additional environmental affective instruments; some of these sources are described below.

Victor J. Mayer (1973) includes five instruments which measure attitudes toward "conservation and the environment" in Handbook of Unpublished Evaluation Instruments in Science Education. This publication is part of the Occasional Paper Series from the ERIC Center for Science, Mathematics, and Environmental Education and contains information on factors being assessed by each instrument, format of instrument, population under study, and reliability, norms, and validation data when available, plus reference

to the original source. Mayer is currently updating this paper and is including two additional affective instruments in environmental education.

Another useful source from the ERIC Center Occasional Paper Series is Roth and Helgeson's A Review of Research Related to Environmental Education (1972). In the section on attitudes and behaviors twelve studies are reported; of these, seven studies pertain to outcomes of experiences related to camping. A Review of Research describes each study and the conclusions drawn from the study but not necessarily the instrument used; however, references are made to the original source.

A recent publication by Voelker, Heal and Horvat (1973) is an attempt to locate recent studies in environmental education which might "give direction to future research and help verify basic assumptions." This publication, Environmental Education--Related Research, 1969-72, is an annotated bibliography of research published in a variety of literature from January 1969 through June 1972. Two sections concerning research on "Knowledge, Attitudes, and Behaviors" are found in the publication; one section relates to Environmental Education in general, particularly in reference to school programs, while the other section is concerned with environmental communications. In both cases it is the published research study which is described and not necessarily specific evaluative instrumentation; however, the original references are cited.

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